

ARCAM FMJ

Digital Radio Tuner

Installation

CONNECTING TO A POWER SUPPLY

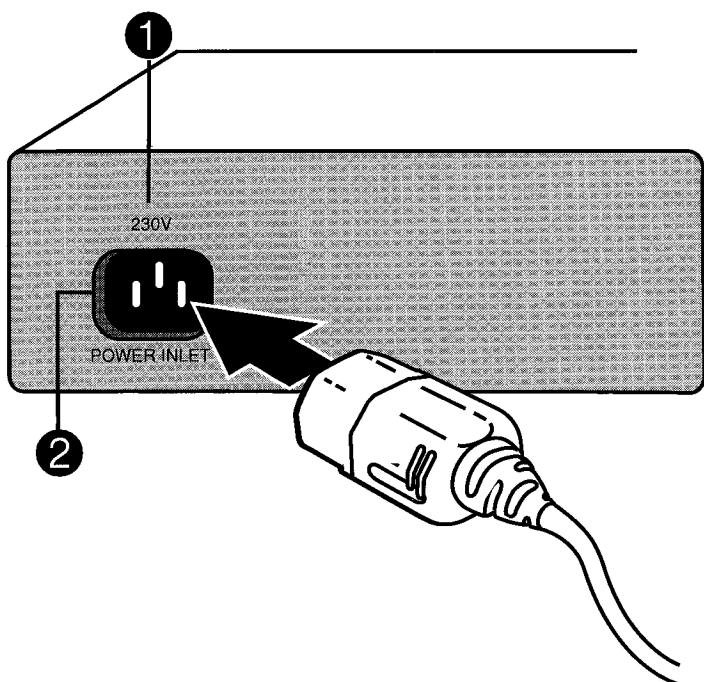
WRONG PLUG ?

Check that your mains supply voltage agrees with the voltage setting on the rear panel of the unit, just above the mains inlet socket ①.

If your mains supply voltage is different, consult your Arcam dealer or distributor or Arcam Customer Support in the U.K. on +44 (0)1223 203203.

Push the plug of the supplied mains lead into the power inlet socket ② on the back of the unit. Make sure it is pushed in firmly. Push the plug on the other end of the cable to your mains supply socket. [Want more info ? See technical note 1 on page 6]

This unit is double insulated and does not require an earth. That is why there is no centre (earth) pin in the mains inlet socket of the tuner.



CONNECTING TO OTHER EQUIPMENT

AUDIO OUTPUTS

There are two pairs of identical outputs provided. Connect one of these to your amplifier's TUNER input using a suitable pair of interconnect cables. Insert the red phono plug into the socket labelled "R" for right and the other phono plug into the socket labelled "L" for left.

The second set of audio outputs can be used to connect to a second amplifier set up for "multi room" use or routed to a tape recorder for "off air" recording.

REMOTE CONTROL IN/OUT

If you are using the digital radio tuner with an FMJ A22 or Alpha 10 integrated amplifier you can connect the "Remote Out" socket of the amplifier to the "Remote In" socket of the tuner with a 3.5mm jack to jack lead. This will enable you to control many functions of the tuner by pointing the remote control at the amplifier and the tuner could then be hidden out of sight.

Note: It is not possible to control the amplifier by connecting the "Remote Out" of the tuner to the "Remote In" of the amplifier.

AM/FM TUNER AUDIO INPUT

If you wish, the audio output from an FM or FM/AM tuner or receiver can be connected to this to save an input on the amplifier. When the digital radio tuner is switched off or set to bypass mode, this input will be routed straight to the audio output of the digital radio tuner and so allowing signals to pass straight through the amplifier.

DIGITAL OUTPUTS

Both optical and co-axial SPDIF (Sony Philips Digital Interface) sockets are provided.

Connect these outputs to the digital inputs of an external DAC (Digital to Analogue Converter) or an Arcam amplifier with the Dave module fitted, or digital recording equipment e.g. DAT, CD Recorder or Minidisc. The digital output data includes Serial Copy Management System (SCMS) codes. This allows you to make one generation of a digital recording but further digital copies will be prevented.

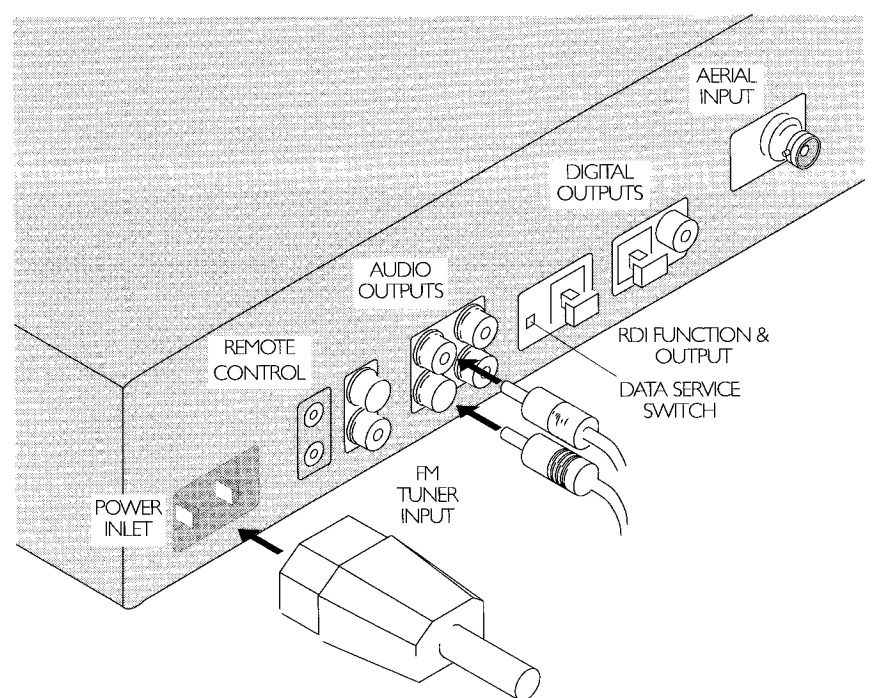
AERIAL INPUT SOCKET

The coaxial cable from the aerial should be fitted with a BNC plug. Connect this to the aerial input socket on the back of the tuner, rotating the front part of the plug to lock it in place.

ADDITIONAL REAR PANEL FUNCTIONS

Data service switch: DAB makes provision for providing dedicated text and other data services in the multiplex datastream. This switch can be used to prevent data services from appearing among the available services on the tuner's display. The tuner cannot process data services by itself so it makes sense to leave this switch in to disable them.

RDI out: This is an optical data output that may allow future expansion to use certain data services via an outboard device such as a personal computer. RDI = Radio Data Interface. The Data Service switch will need to be out to access the data streams from these services.



Installation

Your new Arcam tuner is capable of superb reception but only if it is receiving a good quality transmission signal.

As the signal is so important for good reception we have created a quick reference guide to setting up the aerial.

We recommend that a roof mounted aerial is used where possible, to ensure the best performance. The best aerial to use is a Band 3 (multi-element Yagi) array, if you are a long way from a transmitter, or an omnidirectional or folded dipole if you are close to more than one transmitter. In the U.K. this should be mounted with all elements vertical as the transmissions are vertically polarised. Be sure to use a good quality coaxial cable such as URM43, CT-100 or similar. For band 3 use you can use either 50 ohm or 75 ohm cable provided it is good quality. Always use 50 ohm cable for L band use.

If the signal is strong the supplied indoor aerial may be sufficient. It should be hung on a wall with both wires fully stretched out. However there will be many areas where one DAB ensemble (group of stations transmitted together) is strong and others are weak. An external aerial is desirable in these cases in order to receive a higher number of services. If the DAB services in your area are transmitted on L band (1.5 GHz) then consult your dealer with regard to the best aerial to use.

* Note: The supplied indoor aerial is suitable only for band 3, not L band. Aerial is not supplied in US and Canada.

There is a small aerial made by Bosch which is suitable for L-Band and Band III and has been used with good results. The Bosch part number is: F01DE00144

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FOR MORE INFORMATION

For United Kingdom users the BBC publishes a booklet entitled "Radio Transmitting Stations" which contains details of all BBC transmitters in the UK together with other useful hints and tips. This booklet can be obtained on request by sending a large stamped addressed envelope to:-

BBC Engineering Information Dept.
BBC Radio
201 Wood Lane
London W12 7TS
Telephone: 08700 100123

Internet: <http://www.bbc.co.uk/enginfo/rpb/dab.htm> (For transmitters)
<http://www.bbc.co.uk/dab/> (For general DAB info.)

The Radio Authority publishes a booklet which contains details of all independent radio stations. This booklet can be obtained on request by sending a large stamped addressed envelope to:-

Radio Authority,
Holbrook House,
14 Great Queen Street,
Holborn,
London WC2B 5DG.
Telephone: 0171 430 2724
Fax: 0171 405 7062

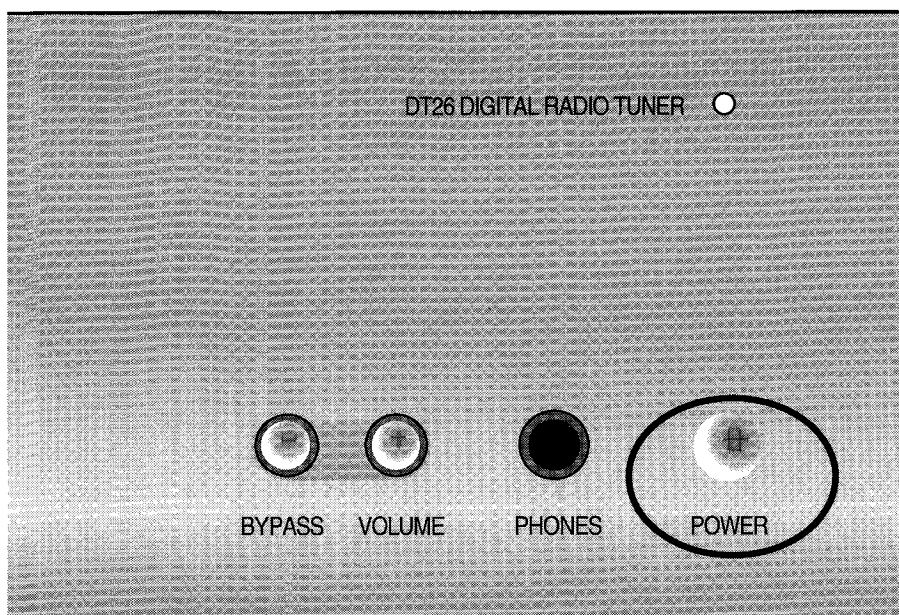
email: info@radioauthority.org.uk
Internet: <http://www.radioauthority.org.uk>



Operating the tuner

POWER SWITCH

Switches the unit on and off. When it is switched on the power indicator above it will glow green. For optimum sonic performance, the analogue power supply is kept powered up all the time the unit is connected to a live mains supply. Releasing the front panel power switch powers down all other circuitry.



FRONT PANEL BUTTONS

Bypass Switch

The bypass switch is used to switch between the digital radio tuners audio output and the audio output of a conventional FM tuner that may be attached to the FM Audio In sockets. The digital output and the headphones socket will continue to output the audio from the currently selected service on the Digital Radio Tuner.

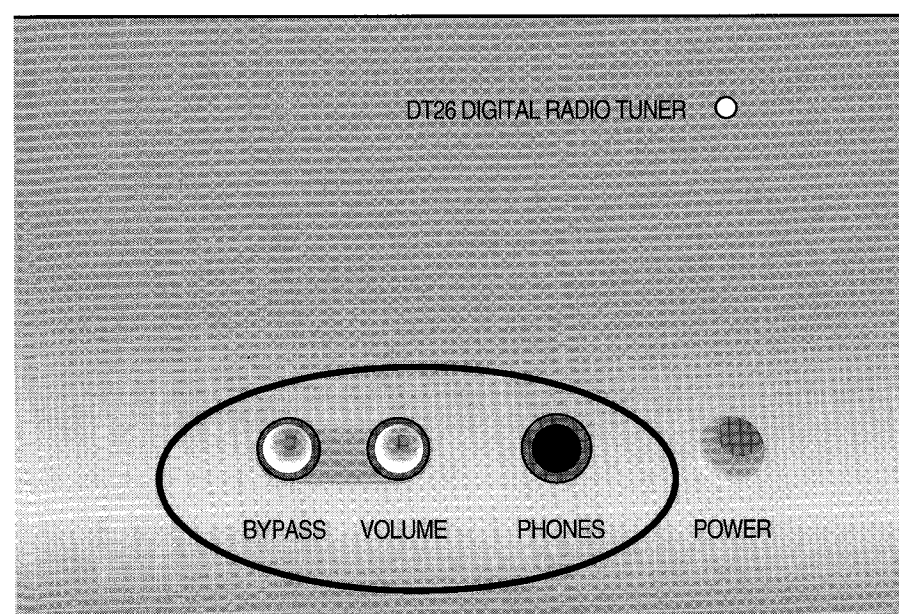
Headphones Socket

Accepts headphones rated between 8 and 600 ohms fitted with a 6.3mm stereo jack plug. If your headphones are fitted with a different plug please contact your dealer for a suitable adaptor. Inserting the headphone jack does not mute (cut off) the audio outputs of the tuner.

Note: Only the audio signal of the currently selected service goes to the headphone socket even in bypass mode. It is not possible to listen to the audio from an FM tuner attached to the digital radio tuner via the headphone socket.

Volume Control

Use this control to adjust the volume level of the headphone socket. It has no effect on the audio output sockets at the rear of the tuner.



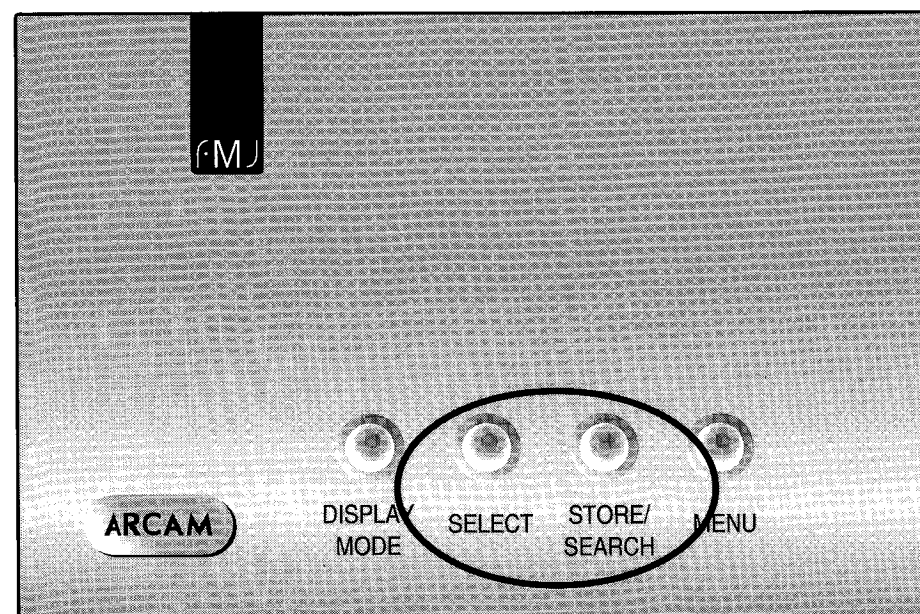
SEARCHING FOR SERVICES

If you are using the tuner for the first time we recommend that you perform a search to find all the available stations. This is because when the tuner leaves Arcam it will have the BBC services stored and these stations will be shown on the front panel display even if they cannot be received. By performing the search it ensures that you have access to all the available stations in your reception area. Once the search has been done you will only need to perform a new search when new ensembles (group of stations) go on air or if you move to a different area.

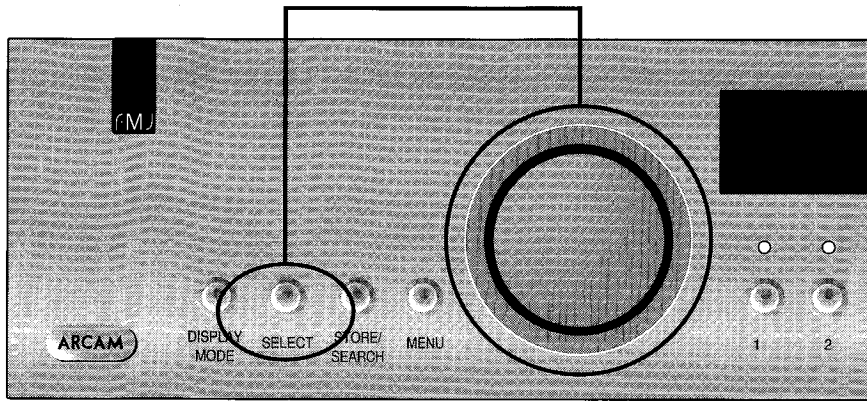
To perform a search for available services (stations)

Press the front panel STORE/SEARCH button then SELECT when prompted. A bar graph will show the progress of the search. This will take about 3 minutes to complete.

If no service is found then the aerial is insufficient or, if you are already using an outdoor aerial, you are outside of the reception area of any DAB transmitters. The search can be cancelled by pressing any front panel button or rotating the main knob.

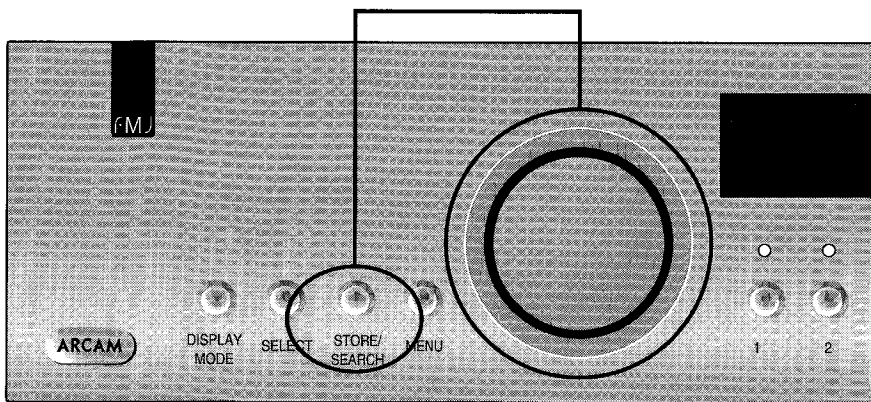


Operating the tuner



TO SELECT A SERVICE

Turn the rotor one click at a time to scroll through the available services. Press SELECT within a couple of seconds, to select the required service. If ">>" is shown in the top right hand corner of the display when the service is selected this indicates that a secondary service is also available. Moving the rotor one more click will show this secondary service. If you wish to listen to this service press SELECT again. [Want more info ? See technical notes 2 & 3 on page 7]

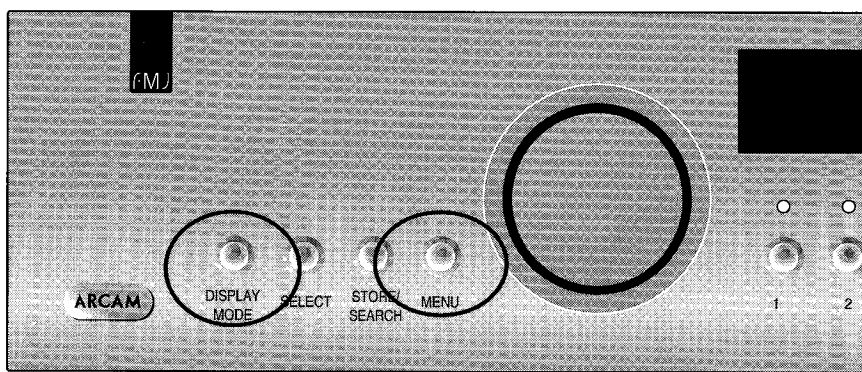


TO PROGRAMME A PRESET

First select the required service (see above). Press STORE/SEARCH followed by the required preset button, within a couple of seconds. 'Preset stored' will be displayed and the led (light emitting diode) above the button will light. Note: It is only possible to set a primary service to a preset and not any secondary ones attached to it. Secondary services are indicated by << in the top right hand corner of the display.

TO SELECT A PRESET

First store the required service as described above and then press the required preset button. A total of 7 presets are available.



TO CHANGE THE DISPLAY MODE

The bottom line of the display can be set to one of 4 modes; Programme type (brief label), dynamic label (scrolling text), data rate (shows service data rate and stereo/mono mode) and signal quality (a bar graph).

Press DISPLAY MODE to cycle through the modes. [Want more info ? See technical notes 2 & 3 on page 7]

MENU BUTTON

The MENU button can be used to access the compression menu and service sort menu.

COMPRESSION MENU:

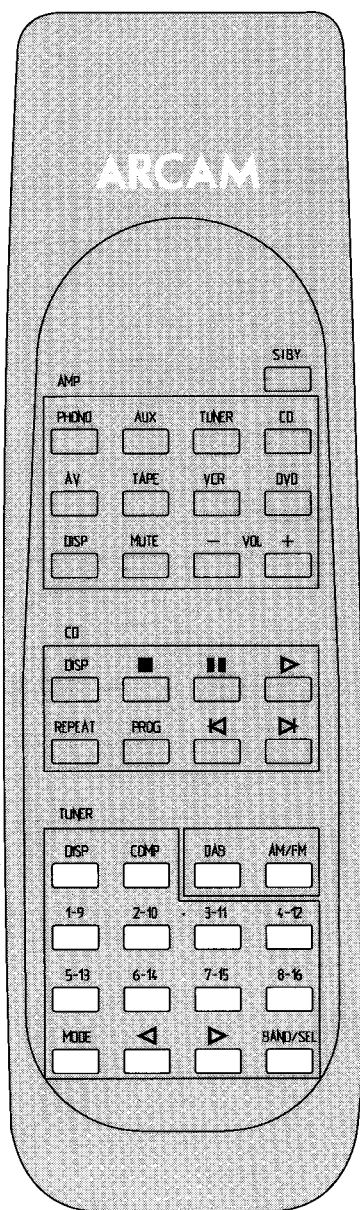
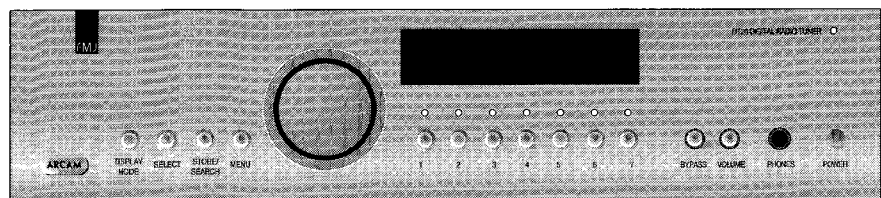
The first press of the MENU button will bring you to this menu. Dynamic range compression (DRC) of the audio may be applied by the receiver if the broadcaster has made it available for that service. The amount is adjustable between 'off' and 1 to 5, 5 being the maximum amount.

The effect of DRC is to flatten out the sound by making quiet parts louder and loud parts quieter. This can be useful if listening to music in a noisy domestic environment or late at night. To set the compression level, turn the rotor to set the level and press SELECT. The tuner will revert to the service select menu if no further buttons are pressed after a few seconds. Once the tuner has returned to the normal menu, the compression will be indicated in the top right corner of the display, by saying C1-C5. This acts as a reminder that compression has been switched on and also that it is available for the current service. Note that this degree of compression will be applied to all services where the broadcaster has transmitted compression data. It is not possible to store different compression levels for different stations.

SERVICE SORT MENU

The second press of the MENU button will bring you to this menu. This can be used to change the order in which services are stored. Set to 'sort by name' ie Radio 1, Radio 2 etc or 'sort by programme type' i.e. Current Affairs, Drama etc, then press SELECT to change the setting. Once this is done the tuner will revert to the normal menu if no more buttons are pressed after a few seconds. Alternatively press MENU again to immediately return to the normal menu.

Using the remote control



REMOTE CONTROL HANDSET

Don't forget to fit the 2 x AAA batteries and ensure they are inserted correctly into the back of the remote handset before using it.

The remote control handset sends a message to an infrared receiver which is located behind the FMJ badge on the front of the tuner. Do not place anything in front of this badge or the remote control may not operate the unit.

The supplied remote control can be used to operate most of the digital radio tuner's functions from the comfort of your armchair. It can also control the volume control and input selector (where appropriate) of all remotely controllable Arcam amplifiers, the basic functions of Arcam CD players (except the Alpha One) and the T21 and Alpha 8 FM tuners.

The TUNER section, shown with white buttons on the diagram, controls both the digital radio tuner and the FM/AM tuner. The codes sent are changed by first pressing the DAB or FM/AM buttons. To control the digital radio tuner first press the DAB button on the remote. This will set the bypass mode to off.

To select a DAB preset, press the appropriate preset number. The digital radio tuner only has 7 presets so the 8/16 button on the remote will have no effect, as this is for use with the FM/AM Tuner.

To duplicate the action of moving the front panel rotor on the tuner to select a service press the LEFT ◀/RIGHT ▶ buttons followed by SEL.

The display brightness can be adjusted by pressing DISP to cycle through the following 3 settings: off, dim or bright. If the display is off then pressing a front panel button or a remote handset button will restore the display for a few seconds and then switch it off again. The display mode can be changed by pressing MODE.

To control an Arcam FM tuner, the remote must be set to FM/AM mode by pressing the FM/AM button. This will automatically set the digital radio tuner to bypass mode and route the FM tuner's audio through the digital radio tuner to your amplifier, if you have connected it up in this way.

ENGINEERING MODE

The digital radio tuner has two modes - User Mode, which is the normal one, and an additional one called Engineering Mode. Engineering Mode enables the user to view certain technical information about the currently selected service. [Want more info? See technical note 4 on page 7].

RADIO INTERFERENCE

The digital radio tuner is an audio device containing microprocessors, and other digital electronics. It has been designed to very high standards of electromagnetic compatibility.

EU countries

This product has been designed to comply with directive 89/336/EEC.

If the equipment causes interference to radio/television reception, which can be determined by switching the equipment off and on, the following measures should be taken:

Reorient the receiving antenna or route the antenna cable of the receiver as far as possible from this appliance and its cabling. Relocate the receiver with respect to this appliance.

Connect the receiver and this appliance to different mains outlets.

If the problem persists contact your Arcam dealer or Arcam Customer Support on +44 (0)1223 203203.

Technical notes

I. This product is normally supplied with a moulded mains plug already fitted to the lead. If for any reason the plug needs to be removed, it must be disposed of immediately and securely, as it is a potential shock hazard when inserted into a mains socket.

This unit is double insulated and does not require an earth.

NOTICE FOR U.K. CUSTOMERS ONLY

The mains inlet socket does not have an earth pin but for convenience the mains lead is a standard 3 wire type. You should connect the **green** and **yellow** wire as described below to prevent the risk of this wire touching either of the other two wires within the mains plug.

If the plug is removed then the remaining lead must be rewired as follows:

- The **blue** wire must be connected to the terminal which is coloured **blue** or marked with the letter **N**.
- The **brown** wire must be connected to the terminal which is coloured **brown** or marked with the letter **L**.
- The **green** and **yellow** wire must be connected to the terminal which is coloured **green** and **yellow**, or marked with the letter **E** or the safety earth symbol.
- When replacing the fuse in the supplied moulded mains plug, the integral fuse holder/cover must always be refitted. Use a 5 amp fuse.

2. A NOTE ON PROGRAMME TYPES

The programme type (PT) label is the short description displayed below the service name. It is important to note that there are two different PTs transmitted, these being static PT and dynamic PT. The static PT is the service 'genre' and does not change. Radio 4's static PT for example is 'Current affairs'. The dynamic PT changes from one programme to the next, and reflects the current programme. Typical dynamic PTs for Radio 4 for example are 'drama', 'news' etc. When a service is selected the dynamic PT is displayed. At other times the static PT is shown. This means that Radio 4 will say 'current affairs' while scrolling through services, then may change to 'drama' when that service is selected. The tuner works this way because it cannot update dynamic PTs for a multiplex to which it is not currently tuned.

It is also important to note that secondary services share their PTs with their parent service. For secondary services the tuner displays the parent's static PT. (Dynamic would not be relevant).

3. A NOTE ON SECONDARY SERVICES

Primary services can have one or more secondary services attached to them. These tend to be temporary; sporting events like football matches for example may be broadcast as secondary services.

Services that have secondary services attached to them are indicated by a '> >' symbol. Turning the rotary selector clockwise will then reveal these services. The secondary services themselves are indicated by a '< <' symbol. You must select the main service in order to see if there are secondary services. At present (March '99) the BBC is signalling secondary services as primary in addition to secondary, so as to work with tuners that do not support secondary services. The effect of this is to make those services appear twice in the list, once as primary and once as secondary. Note: It is only possible to set a primary service to a preset and not any secondary ones attached to it.

4. USER MODE / ENGINEERING MODE

There are 2 modes - User Mode and Engineering Mode. The unit always powers up in User Mode, the operation of which is described in the main body of the handbook.

Engineering Mode enables the user to view technical information about the currently selected service. To access Engineering Mode press SELECT and preset button 7 simultaneously.

The display will show ENGINEERING MODE briefly. Once in Engineering Mode you can go back to User Mode by pressing SELECT & preset 7 again. In Engineering Mode each of the 7 preset buttons will show different technical information about the selected service.

Preset 1: Ensemble frequency. The carrier frequency of the currently selected ensemble.

Preset 2: Service data rate. The data rate of the current service in Kilobits per second. The higher the number the better the sound quality.

Preset 3: Service start and end CU (capacity unit) numbers. This indicates the services position within the ensemble.

Preset 4: Viterbi error/ CRC failure count. Viterbi rate indicates the amount of error correction that is going on. The audio decoding will normally work correctly with viterbi rates of up to approximately 200. Above this, audible degradation of the signal may become apparent. The CRC (cyclic redundancy check) count indicates the amount of uncorrected errors. If this is above zero then you will also hear severe audio disruption.

Preset 5: Signal strength (AGC). A measure of raw RF strength at receiver front end.

Preset 6: Transmitter ID information. Shows the IDs (identities) of all the transmitters detected for the current ensemble. DAB radio uses multiple transmitters for the same signal and can add together for best results. If you turn the rotor you can see how many transmitters are being picked up.

Preset 7: Audio Mode: stereo/mono etc., shows that the selected programme is being transmitted in stereo, joint stereo or mono modes.

Trouble shooting guide

1. Display shows 'Service not found' when an attempt is made to select a service:

This can happen when the tuner has an ensemble stored that is no longer available. For example when the tuner is first shipped it has the BBC ensemble stored, and if it is used in another country then that ensemble will not be available. In this situation one should perform a search. Note that re-configuration of services within an ensemble is handled without having to perform a search, so if services are added or removed from the ensemble it is not necessary to perform a search. This may also happen when an attempt is made to select a service that has been removed from the ensemble. Normally redundant services are automatically removed from the list but occasionally they are not. If this happens simply select another active service. This will remove the redundant services from the list of available services and from any stored presets.

The other situation when the tuner may fail to select a service is when the signal strength is insufficient. When a service is not selected it is possible to view the signal strength in Engineering Mode (provided an attempt has been made to select a service from the required ensemble). Generally the meter needs to be past the 'E' in 'Strength' for reliable reception. We strongly recommend that an external aerial is always used for the best possible performance. If the signal strength is marginal then an indoor aerial will only work some of the time, as the signal quality is affected by weather and the time of day.

Note: There will be situations where some ensembles are strong and others are weak. With a good aerial you may be able to weakly pick up some ensembles from outside their practical coverage range.

2. Display shows 'No Signal':

If a signal at the required frequency is missing entirely, then the tuner will display this message. Note that it may take some time (about 1 minute) to show the message. If you have removed the aerial and this message appears, reconnect the aerial and reselect a service to restore operation.

3. Display shows 'No services stored' at the end of the search:

This will happen when the signal strength is insufficient due to either a poor aerial or lack of an available DAB signal.

4. Audio is lost and display shows 'signal weak - muted':

This happens when the signal becomes weak. A better aerial will be required.

5. Audio is lost and display shows 'Service ended' or 'Arcam DAB Tuner':

This will happen if the selected service is no longer being broadcast. (In practice this will rarely happen.) Select another active service.

6. Display shows 'No service stored' when a preset button is pressed:

If a service has not been assigned to a preset button then this message will be shown. This will also happen if that service is removed from the ensemble, even temporarily, because the preset will be deleted. If the tuner is used under conditions of weak signal strength then occasionally presets may be lost. This is because if ensemble components are only partially detected then the tuner will sometimes decide that a service has been removed and will delete the preset.

Notes on data rate and sound quality:

The tuner supports MPEG audio data rates up to 256 kb/s which is the maximum rate as defined by the ETSI specification for DAB radio. Data rates transmitted will generally be lower than this because broadcasters prefer to make use of available bandwidth to include a high number of services. Higher compression factors are used to get lower data rates, and this makes audio quality worse. Most stereo services operate at 192kb/s at present, and this has been found to give very high quality audio (though 256 is even better). Some speech based services use mono in order to reduce the data rate and some apply higher compression as well. It is also common to find that different services have different audio quality even though they operate at the same data rate. This is due to differences in the audio processing techniques used in the transmission chain. Generally speaking, audio is transmitted without dynamic range compression (DRC) being applied (unlike FM broadcasts are). DAB uses a system whereby the coefficients for DRC are transmitted separately, so that the tuner can actually apply the compression itself. This is beneficial because the listener can decide whether or not to have DRC, most hi-fi enthusiasts do not. However some DAB broadcasts still have some form of DRC applied to the audio itself, and this is generally detrimental to the audio quality.

If your tuner locks or 'hangs', the unit can be reset by switching the power off and on again.

Guarantee

WORLDWIDE GUARANTEE

This entitles you to have the unit repaired free of charge, during the first two years after purchase, at any authorised Arcam distributor provided that it was originally purchased as new from an authorised ARCAM dealer or distributor.

The manufacturer can accept no responsibility for defects arising from accident, misuse, abuse, wear and tear, neglect or through unauthorised adjustment and/or repair; neither can they accept responsibility for damage or loss occurring during transit to or from the person claiming under the guarantee.

The warranty covers:

Parts and labour costs for two years from the purchase date. After two years you must pay for both parts and labour costs. The warranty does not cover transportation costs at any time.

CLAIMS UNDER GUARANTEE

This equipment should be packed in the original packing and returned to the dealer from whom it was purchased, or failing this, directly to the Arcam distributor in the country of residence. It should be sent carriage prepaid by a reputable carrier - NOT by post. No responsibility can be accepted for the unit whilst in transit to the dealer or distributor and customers are therefore advised to insure the unit against loss or damage whilst in transit.

For further details contact Arcam at:

ARCAM Customer Support Department, Pembroke Avenue, Denny Industrial Centre, Waterbeach, Cambridge, CB5 9PB, England.

Telephone: +44 (0)1223 203203 Fax: +44 (0)1223 863384

e-mail: support@arcam.co.uk

Technical specification

Supply voltage: 115v or 230v AC
Power consumption: 30W operational
5W standby

Analogue audio output

Level: 2.4V RMS @ 0dB FS
Output impedance: <100 Ω
Minimum load: >600 Ω
Bandwidth (+/-0.5dB): 20Hz - 20kHz

Headphone output

Level: variable up to >100mW
max into 32 Ω
Output impedance: 110 Ω nominal
Load impedance: 8- 600 Ω
Connector: 6.35mm (0.25 inch) stereo jack
socket

Digital audio output

Format: SPDIF coaxial & optical (TOSLINK)
Sample rate: 48kHz
Output impedance
(coaxial): 75 Ω unbalanced

RDI (Radio Data Interference) output

Format: Optical (TOSLINK)
Modulation: Bi-phase (IEC-958)

RF input

Tuning range: 174-240MHz (Band III)
1452-1492MHz (L-band)

Aerial

Impedance: 50 Ω nominal in operational
frequency range
Connector: BNC

Decoding

Maximum audio data rate: 256kbit/s MPEG layer II
Maximum number of
stored services: 128
Dimensions W/D/H mm 430x310x100
Weight 6 kg nett/ 8.62. kg packed
Supplied accessories mains lead
Remote control inc 2 x AAA
batteries
Simple indoor aerial
(Wire Dipole) - not supplied in
US & Canada

E&OE

Safety Guidelines

This product was designed and manufactured to meet strict quality and safety standards. There are, however, some installation and operation precautions of which you should be particularly aware :

1. Read Instructions - All the safety and operating instructions should be read before the appliance is operated.

2. Retain Instructions - The safety and operating instructions should be retained for future reference.

3. Heed Warnings - All warnings on the appliance and in the operating instructions should be adhered to.

4. Follow Instructions - All operating and use instructions should be followed.

5. Water and Moisture - The appliance should not be used near water - for example near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement or near a swimming pool, etc.

6. Racks and Stands - The appliance should be used only with a rack or stand that is recommended for use with audio equipment. If the equipment is on a portable rack it should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the combination to overturn.

7. Ventilation - The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug or similar surface that may block the ventilation openings or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings. We recommend a minimum distance of 50mm (2 inches) around the sides and top of the apparatus to provide adequate ventilation.

8. Heat - The appliance should be situated away from naked flames and equipment such as radiators, stoves or other appliances (including amplifiers) that produce heat.

9. Power Sources - The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

10. Grounding - Precautions should be taken so that the grounding means of the appliance is not defeated.

11. Power-Cord Protection - Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords and plugs, and the point where they exit from the appliance.

12. Cleaning - Unplug the unit from the mains supply before cleaning. The appliance should normally only require a wipe over

with a clean, dry, lint-free cloth. If it is heavily soiled then a cloth slightly dampened with a water/washing up liquid solution may be used. Dry the unit afterwards with a dry cloth.

We do not advise the use of furniture type cleaning sprays/polishes as this can cause white marks, which are very difficult to remove, if the unit is then wiped over with water.

13. Power Lines - An outdoor antenna/ aerial should be located away from power lines.

14. Non-use Periods - If the unit has a stand by function a small amount of current will continue to flow in the equipment in this mode. The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

15. Object and Liquid Entry - Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through any openings. Objects filled with liquids, such as vases, should not be placed on the equipment.

16. Abnormal Smell - If an abnormal smell or smoke is detected from the appliance, immediately turn the power off and unplug the unit from the wall outlet. Contact your dealer immediately.

17. Damage Requiring Service - The appliance should be serviced by qualified service personnel when:

A. The power-supply cord or the plug has been damaged or:

B. Objects have fallen, or liquid has spilled into the appliance or:

C. The appliance has been exposed to rain or:

D. The appliance does not appear to operate normally or exhibits a marked change in performance or:

E. The appliance has been dropped or the enclosure damaged.

18. Servicing - The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

19. The appliance has been designed for use in moderate climates.